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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/683,658	01/31/2002	Mark Philip D'Evelyn	121655	1463

6147 7590 07/18/2006

GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 07/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/683,658	Applicant(s) D'EVELYN ET AL.	
	Examiner Jennifer A. Leung	Art Unit 1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2006.
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 104-106, 112, 130 and 145-155 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 104-106, 112, 130 and 145-155 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on April 12, 2006 has been received and carefully considered. Claims 1-103, 107-111, 113-129, 131-144 are cancelled. Claims 147-155 are newly added. Claims 104-106, 112, 130 and 145-155 are under consideration.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 150-152 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear as to the structural limitation applicant is attempting to recite because the "metal nitride composition", the "single crystal metal nitride composition" and the "aluminum nitride" are products formed by the apparatus, and are therefore not considered elements of the apparatus.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 104, 105, 112, 130, 145 and 154 are rejected under 35 U.S.C. 102(b) as being anticipated by Wilson et al. (US 3,473,935).

Regarding claim 104, Wilson et al. (FIG. 1, 2) discloses an apparatus comprising:

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a capsule having an interior surface defining a volume (i.e., closed and sealed capsule 31, defining a chamber; column 2, line 61 to column 3, line 7), wherein the capsule is configured to receive a material and a fluid in the capsule volume (i.e., the capsule is capable of receiving a material 29 to be crystallized, and water in an amount not exceeding about 6.5 wt percent of the material; column 4, lines 2-20);

a restraint (i.e., core 16) having an interior surface defining a chamber receiving capsule 31; and

an energy source operable to supply thermal energy to the capsule 31 (i.e., a heating element comprising a carbon cylinder 33 proximate to said capsule 31, and a wattage control system comprising conductors 39 and 40 electrically coupled to said heating element 33; column 3, lines 45-54).

Because the apparatus is configured to obtain pressures of up to 60,000 atmospheres in the capsule (column 3, lines 43-44) and temperatures of up to about 2000 °C (see Examples I-VI) in the capsule, the fluid (i.e., water) added to the capsule 31 is inherently operable to become supercritical at a predetermined temperature and a predetermined pressure, because water is known to be supercritical above approximately 374 °C and approximately 22.06 MPa. Please note that the particular pressures and temperatures selected within the operable ranges are considered process variables that add no further patentable weight to the apparatus claim.

Regarding claim 105, the restraint 16 is operable to counterbalance the pressure in the capsule 31, and the restraint 16 being is immobile relative to the capsule 31 while counterbalancing the capsule 31 pressure (i.e., given that water, when heated to the disclosed temperatures under the constant volume of the capsule, inherently expands to thereby pressurize the inside of the capsule to the disclosed pressures; see examples I-III).

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Regarding claims 112 and 154, Wilson et al. discloses a clamp (i.e., binding rings 11-15) in contact with the restraint 16, operable to reduce a pressure load on at least a portion of the restraint 16 that causes longitudinal stress on the restraint portion.

Regarding claim 130, as defined in section [0032] of the specification, the "pressure response" is the "percent increase in cell pressure divided by the percent increase in press force that produces the increased cell pressure, relative to a reference operation condition." Such are variables of an intended process. The apparatus of Wilson et al. structurally meets the claims because the "pressure response" is not considered an element of the apparatus.

Regarding claim 145, the capsule 31 and the restraint 16 are inherently capable of maintaining a seal to the fluid (i.e., water) at a given internal pressure and at a corresponding temperature, as evidenced by the synthesis of Beryl crystals with the addition of water, under the disclosed temperatures and pressures of Examples I-III. (Clearly, one would not include water in the capsule under the disclosed temperature and pressure conditions if water leaked out of the capsule). Please note that the claimed limitation relating to the fluid and its corresponding pressure within the capsule provides no further patentable weight to the claim because the fluid has not been considered an element of the apparatus.

Instant claims 104, 105, 112, 130, 145 and 154 structurally read on the apparatus of Wilson et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claim 106 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. (US 3,473,935) in view of Hall et al. (US 2,947,610).

Wilson et al. discloses a heating system comprising an energy source (i.e., carbon tube 33, electrically coupled to conductors 39 and 40; column 3, lines 45-54). Wilson et al., however, is silent as to the system further comprising a temperature sensor, disposed proximate to the capsule 31 and operable to sense the temperature of the capsule 31. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a temperature sensor to the apparatus of Wilson et al., on the basis of suitability for the intended use, because the examiner takes Official Notice that it is well known in the art to provide temperature sensors to apparatus in order to enable the monitoring and/or controlling of process variables, as evidenced by Hall et al. In particular, Hall et al. (see column 7, lines 18-63) teaches an apparatus, similar to the apparatus of Wilson et al., wherein the temperature in a reaction vessel 32 is determined by fairly conventional means of placing a thermocouple in the reaction vessel and measuring the temperature in the usual manner. Electrical energy at a predetermined rate is then supplied to the apparatus, and the temperature produced by this power is measured by

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the thermocouple. The same procedure is repeated with different power inputs to produce a calibration curve of power input versus the temperature in the reaction vessel. The temperature within reaction vessel 32 is thus controlled in a "closed loop" fashion according to the power input to the apparatus in conjunction with the calibration curve.

5. Claims 146-153 and 155 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. (US 3,473,935) in view of Flanigen (US 3,567,643).

Regarding claims 146, 147 and 155, Wilson et al. (FIG. 1, 2) discloses an apparatus for synthesizing beryl, comprising:

a capsule having an interior surface defining a volume (i.e., closed and sealed capsule 31,

defining a chamber; column 2, line 61 to column 3, line 7), wherein the capsule is configured to receive a material and a fluid in the capsule volume (i.e., the capsule is capable of receiving a material 29 to be crystallized, and water in an amount not exceeding about 6.5 wt percent of the material; column 4, lines 2-20);

a restraint (i.e., core 16) having an interior surface defining a chamber receiving capsule 31; and an energy source operable to supply thermal energy to the capsule 31 (i.e., a heating element

comprising a carbon cylinder 33 proximate to said capsule 31, and a wattage control system comprising conductors 39 and 40 electrically coupled to said heating element 33; column 3, lines 45-54).

The apparatus is configured to obtain pressures of up to 60,000 atmospheres (column 3, lines 43-44) and temperatures of up to about 2000 °C (see Examples I-VI) in the capsule.

Wilson et al., however, is silent as to whether the material and the fluid may comprise an amount of metal material and an amount of ammonia.

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Flanigen teaches the synthesis of single crystals having the structure of beryl, and particularly beryl analogs doped with transition metal or rare earth metal ions (column 3, lines 67-74). The material and fluid selected for synthesizing the product comprises aluminum and ammonia (see column 4, lines 3-17 and 65-69; column 5, lines 47-71). Flanigen teaches that,

“Since the process of this invention is a hydrothermal process which is conducted at elevated temperatures and pressures, the process is most easily conducted in a sealed reaction vessel, autoclave or bomb of a type well known in the hydrothermal art of crystal synthesis. A variety of these reaction vessels are commercially available and are highly suitable for use in practice of this invention.” (column 4, lines 32-39).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the metal and ammonia as taught by Flanigen for the material and fluid being processed by the apparatus of Wilson et al., on the basis of suitability for conducting an intended process of synthesizing other known beryl structured compounds. The apparatus of Wilson et al. would have been suitable for conducting the crystal synthesis using metal and ammonia as taught by Flanigen because apparatuses of the type disclosed by Wilson are well known in the hydrothermal art of crystal synthesis.

The ammonia that would be added to the capsule is inherently operable to become supercritical ammonia, because ammonia the temperature and pressure at which the ammonia becomes supercritical falls within the operable pressure and temperature ranges of the apparatus. Please note that the particular pressures and temperatures selected within the operable ranges are considered process variables that add no further patentable weight to the apparatus claim.

Regarding claims 148, 149 and 153, a temperature and pressure sufficient to form aluminum nitride is achievable by the apparatus of Wilson et al. (i.e., said temperature and said

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pressure falls within the operable temperature and pressure ranges cited above).

Regarding claims 150-152, Applicants are attempting to claim a product which is to be synthesized by the apparatus. However, the recitation of a material worked upon does not limit apparatus claims (see MPEP 2115). Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim.” *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, “[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.” *In re Young*, 75 F.2d 996, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). In *In re Young*, a claim to a machine for making concrete beams included a limitation to the concrete reinforced members made by the machine as well as the structural elements of the machine itself. The court held that the inclusion of the article formed within the body of the claim did not, without more, make the claim patentable. The modified apparatus of Wilson et al. thus meets the claims.

Response to Arguments

6. Applicant’s arguments submitted on April 12, 2006 have been fully considered, but they are not persuasive. Beginning on page 6, from the second paragraph to the end of the page, Applicants argue,

“... the apparatus shown or disclosed differs from the invention as defined at least in independent claims 104 and 146. Ignored are the recitations of “to maintain the chamber at a substantially constant volume” and “to maintain the chamber at about a constant volume”.

The core 16 indicated in the Office Action as anticipating the restraint is not bounded on at least two sides as shown in Fig. 1. The top and the bottom of the core 16 of Wilson et al are open. The core 16 of Wilson et al. provides, at best, two-dimensional control, and

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cannot provide three-dimensional control. "Volume" is a three-dimension unit. A prior art element having both the function and structure of the restraint as defined in the independent claim is not shown. Accordingly, Applicant expects that a rejection based on an accumulation of prior art elements (the core 16 plus the two press pistons 23 and 24) would similarly not anticipated the independent claims."

"Wilson et al. discloses the core 16 is a tungsten carbide core.... The bores, and counterbores cooperate with the pistons "...to impose pressure on the sample..." Applicant has gone to great lengths to indicate that actively imposing pressure differs from providing a counterbalancing pressure."

The Examiner respectfully disagrees. Firstly, it is unclear as to how the restraint 16 used in combination with the two pistons 23 and 24 as disclosed by Wilson et al. (FIG. 1) differs structurally from Applicant's own restraint system. For instance, sections [0029] and [0030] describe Applicant's own restraint 24 to comprise,

"... any number of combined devices such as, but not limited to, hydraulic presses, plates, clamps, belts, dies, punches, anvils, pistons, or the like," and

"In one embodiment, restraint 24 includes a uniaxial hydraulic press (not shown), a pair of opposing punches (for example, top punch 100 and bottom punch 102), a die 104, and at least one compression ring 106."

Looking now to Applicant's FIG. 1, it can be seen that the restraint 24 system is substantially identical to the restraint system disclosed by Wilson et al. Applicant's die 104 structurally and functionally parallels Wilson et al.'s tungsten carbide core 16. Also, Applicant's opposing punches 100 and 102 structurally and functionally parallels Wilson et al's pistons 23 and 24, respectively. Given that both the restraint systems of Applicant and Wilson et al. are substantially identical, it is unclear as to how the restraint 16/23/24 of Wilson et al. could function differently than Applicant's own restraint 24. Hence, the Examiner maintains that the

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functional limitations were not simply ignored, and that the apparatus of Wilson is structurally capable of maintaining the chamber defined by the restraint at a substantially constant volume.

On page 7, first full paragraph, Applicants further argue,

“Claim 130 is amended in another good faith attempt to functionally define the quality, character or attribute of the restraint that is measurable as a pressure response. Applicant believes that the “pressure response” function is now positively set forth as an element of the claim using acceptable functional claim language.”

The Examiner respectfully disagrees. Again, section [0032] of Applicant’s specification states that the “pressure response” is the “percent increase in cell pressure divided by the percent increase in press force that produces the increased cell pressure, relative to a reference operation condition.” Such are variables of an intended process. The apparatus of Wilson et al. structurally meets the claims because the “pressure response” is not considered an element of the apparatus.

While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function.

In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,

1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board’s finding of anticipation of claimed apparatus because the limitations at issue were found to be inherent in the prior art reference); see also *In re Swinehart*, 439 F.2d

210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971); *In re Danly*, 263 F.2d 844, 847, 120 USPQ

528, 531 (CCPA 1959). “[A]pparatus claims cover what a device is, not what a device does.”

Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528

(Fed. Cir. 1990) (emphasis in original).

On page 7, third paragraph, Applicants further argue,

“Pressure limits for capsules or cells in Wilson et al. are disclosed to be up to 60 kBars... For at least claim 145, Wilson et al. does not disclose or enable a pressure capability approaching the claim definition. Without disclosure of the claim elements, there can be no anticipation.”

The Examiner respectfully disagrees. Instant claim 145 recites an internal pressure in a range of “greater than about 60 kbar”. Wilson et al. discloses pressures up to 60,000 atmospheres in the capsule (see column 3, lines 43-45), which is equivalent to about 60.795 kbar. The two numerical ranges overlap.

On page 9, second paragraph, Applicants further argue,

“That a cited reference may be modified is not the standard, rather a reason for the combination or modification must be given. Clearly, Wilson et al did not believe a sensor was necessary, otherwise they would have disclosed one. Similarly, Hall et al. does not disclose other elements of the claimed invention because that was not the intent or understanding of Hall et al. For the cited art to be combined, without the benefit of impermissible hindsight reconstruction, there must be some reason or motivation provided beyond mere “because it is well known in the art to connect a control system with a temperature to enable precise, closed loop control of the reaction temperature.”

The Examiner respectfully disagrees. In response to Applicant's argument that the Examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the Applicant's disclosure, such a reconstruction is proper. See *In re*

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McLaughlin, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Additionally, in response to Applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the Examiner asserts that the benefits of providing a temperature sensor to a reactor for enabling automated and precise control of reactor conditions is knowledge generally available to one of ordinary skill in the art. The enabling of automated and precise control of reaction conditions would be one well-known reason for making the above combination. Hall et al. further teaches that, "The temperature in the reaction vessel is determined by *fairly conventional means* such as by placing a thermocouple junction in the reaction vessel and measuring the temperature of the junction *in the usual manner*. (see column 7, lines 18-21). The provision of a sensor for enabling the measurement of reactor temperature (and subsequent control of reactor temperature) is therefore conventionally known in the art.

In addition, Applicants (page 10, first paragraph) argue,

"...an explanation would be useful as to why one of ordinary skill in the art would take a simple and functional apparatus as shown in Wilson et al. and start adding components and control systems to increase the complexity and cost."

In response to Applicant's arguments with respect to the economic feasibility of the combination, the fact that a combination would not be made by businessmen for economic reasons does not

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mean that a person of ordinary skill in the art would not make the combination because of some technological incompatibility. *In re Farrenkopf*, 713 F.2d 714, 219 USPQ 1 (Fed. Cir. 1983) (Prior art reference taught that addition of inhibitors to radioimmunoassay is the most convenient, but costliest solution to stability problem. The court held that the additional expense associated with the addition of inhibitors would not discourage one of ordinary skill in the art from seeking the convenience expected therefrom.).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

* * *


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Leung
July 10, 2006



ALEXA DOROSHENK NECKEL
PRIMARY EXAMINER